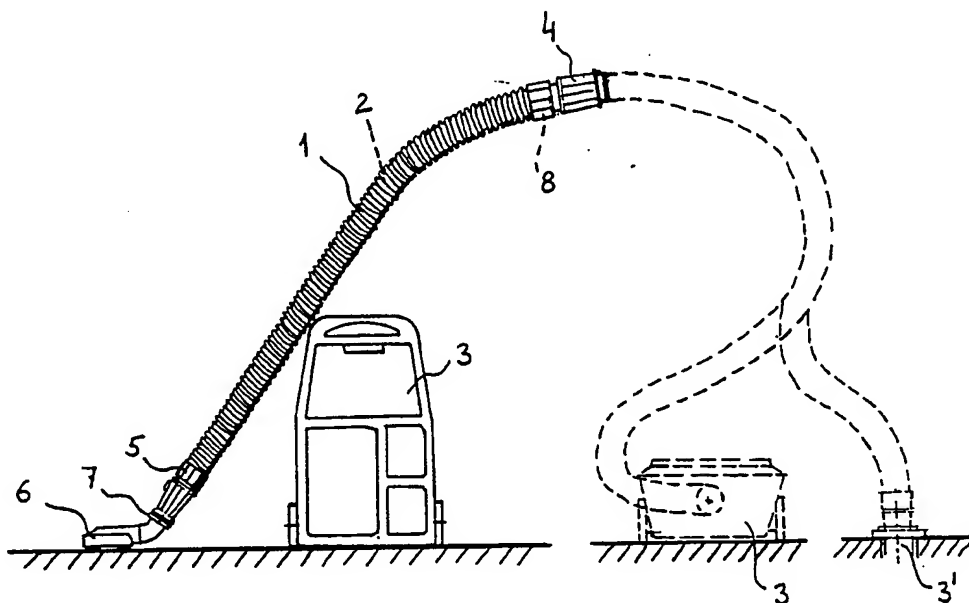




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(54) Title: SUCTION CONDUIT DEVICE CONNECTABLE TO A FLOOR VACUUM CLEANER OR A CENTRAL SUCTION SYSTEM



(57) Abstract

A suction conduit device (1, 2) connectable to a floor vacuum cleaner (3) or a central suction system (3'). The device comprises a flexible suction hose (1) being axially contractable from an operative position substantially free of tension to a compressed storage position, in which it is entirely inserted into or mounted onto a rigid tube handle (2). The suction hose and the tube handle are provided with mutually cooperating holding means (4, 5, 7, 8) to retain the suction hose in its contracted storage position, so that the tube handle (2) and the suction hose (1) form a telescopical unit, which is storable in a compact state separate from the floor vacuum cleaner or the central suction system.

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## SUCTION CONDUIT DEVICE CONNECTABLE TO A FLOOR VACUUM CLEANER OR A CENTRAL SUCTION SYSTEM

The present invention relates to a suction conduit device connectable to a floor vacuum cleaner or a central suction system, comprising a flexible, axially stretchable suction hose, being connectable to a suction opening in said floor vacuum cleaner or said central suction system, and a rigid tube handle, possibly consisting of several tube sections, for connection between the suction hose and a suction nozzle, wherein the suction hose and the tube handle are dimensioned to at least partly slide telescopically into each other.

Such suction conduit devices are previously known, e.g. from US-A-2,867,833 (Duff) and EP-A-37674 (Dyson).

In both these known devices, the vacuum cleaner is a combination apparatus, which can be converted between a position for floor vacuum cleaning without a hose, wherein the elongated apparatus casing is upright and via a lower suction opening sucks dirt directly into a filter bag inside the apparatus, particularly by means of a rotating brush, and a position for manual vacuum cleaning above the floor, wherein a suction hose stored in the apparatus casing is connected to the filter bag and pulled out from its storage position for conventional vacuum cleaning by means of a suction nozzle easy to handle. Here, suction hoses are used which in the storage position are relatively short and which can be resiliently extended temporarily to a length being up to four times longer than in its state of rest (storage position).

In the device according to US-A-2,867,833 (Duff) the suction hose and a straight, rigid tube section, which is inserted into the suction hose, are stored in a tubular storage space in

the apparatus casing, whereas another, likewise rigid tube section connected to the straight tube section at its upper end, serves as a handle during floor vacuum cleaning. When converting the apparatus for manual vacuum cleaning, the rigid tube sections and the suction hose are lifted out of the storage space, whereupon one end portion of the suction hose is connected to an upper suction opening in the apparatus, while its second end portion is connected to the bent tube section, which in turn can be connected to the straight tube section should a longer tube handle be desired. During the manual vacuum cleaning the hose is kept resiliently extended to a desired length, which may correspond to three or four times the length in the state of rest (storage position). When converting back to floor vacuum cleaning, the hose is removed from the upper suction opening, and the tube sections are separated from the hose and are turned around. Thereafter, the straight tube section is pushed through the hose and is inserted into the storage space of the apparatus and is secured in storage position by bayonet locking. The bent tube section projects freely from the hose and serves as a manouvering handle.

In the device according to EP-A-37674 (Dyson), one end portion of the suction hose is permanently connected to the apparatus casing, which for this purpose is provided with a connection sleeve fixedly mounted at a suction opening. A rigid tube provided with a handle is telescopically insertable through the second end portion of the suction hose and can be inserted into a storage position, wherein the tube is secured in the connection sleeve of the apparatus casing and the handle can be used for manoeuvring of the apparatus during floor vacuum cleaning. Automatically operating valve devices ensure that a suction opening located at the bottom part of the apparatus is connected to the filter bag. When converting the apparatus for manual vacuum cleaning, the tube is pulled out of the connection sleeve and the suction hose, and an abutment at the end portion

of the tube ensures that this end portion is not separated from the suction hose but engages with an end sleeve member of the suction hose. Thereafter, vacuum cleaning can be performed in a usual manner. Even in this case the suction hose is very short in its state of rests (storage position) and must be resiliently extended in order to reach a desired range relative to the apparatus casing. Separate storage of the suction conduit device is not possible in this apparatus.

Thus, in both of the known apparatuses, the suction conduit device (suction hose and tube handle) is stored inside or on the apparatus casing itself, and the rigid tube handle is partly inserted into the suction hose and mechanically coupled to the apparatus casing, so that its upper portion can serve as a manouvering handle during floor vacuum cleaning (wherein the suction hose is not used).

The object of the present invention is to achieve a suction conduit device being separable in its entirety from a floor vacuum cleaner or a central suction system and which can be stored as a compact unit separately from the floor vacuum cleaner or the central suction system. Another object is to use a suction hose having a greater length in its operative position, without being resiliently extended in the longitudinal direction, than in the known apparatuses, so that the suction hose does not exert any pulling force on the floor vacuum cleaner or on the suction opening connection of the central suction system during vacuum cleaning. Finally, the suction conduit device should be easy to handle and should be easily convertible between an operative position and a compact storage position.

These objects are achieved in a suction conduit device according to the invention the features of which are principally stated in claim 1. Suitable developments and details are stated in the sub-claims.

Thus, as is apparent from claim 1 the suction hose is axially contractable from an operative position to a contracted storage position inside or on the tube handle. In the operative position, the suction hose is essentially free from tension and, thus, exerts no force on the floor vacuum cleaner (except when the latter is to be moved) or the suction opening connection of the central suction system. Hereby, normal manual vacuum cleaning is facilitated as the tube handle and the nozzle mounted thereon can be manoeuvred without being affected by a disturbing force from the suction hose. It is, of course, also possible to further use the axial stretchability of the suction hose and somewhat extend the same resiliently, for example when vacuum cleaning highly located cupboards, light appliances or the like, whereby the floor vacuum cleaner can be left on the floor. The suction hose is telescopically insertable or mountable relative to the tube handle and can thus be stored together with the same as a compact unit upon mounting or insertion (after the suction hose has been separated from the floor vacuum cleaner or the suction opening connection of the central suction system). It is hereby an advantage to store the floor vacuum cleaner itself separately from the suction conduit device (suction hose and tube handle, possibly with a suction nozzle mounted thereon), as the floor vacuum cleaner is relatively heavy (but also compact), whereas the suction hose and the tube handle are relatively bulky lengthwise (but also light-weight). It is, of course, easier to place two such separate units, i.e. in a cleaning cupboard, than to place a single unit being both heavy and bulky. In comparison with conventional vacuum cleaners, the suction hose is further kept in a well defined position and needs not be hung separately on a special holder. Furthermore, it is well protected against mechanical stress, since it is supported from the inside or protected from the outside by the tube handle. Thus, the risk of it being squeezed or worn out is eliminated which is often the case when storing the same separately.

The mutually co-operating holding means of the suction hose and the tube handle, which keep the suction hose in its contracted storage position inside or on the tube handle, can easily be designed so as to facilitate the conversion between the operative and storage positions, as will be described below.

Furthermore, the suction conduit device according to the invention has the following advantages:

- it can be connected also to existing floor vacuum cleaners or central suction systems;
- internal transport within the premises are facilitated, especially in stair-ways, wherein the vacuum cleaner and the compact suction conduit unit can be carried separately, for example one in each hand;
- storage in sales areas is simple and requires only a small space;
- the suction conduit device can be packed in space-saving, thin packages;
- the suction hose is stable also in its operative position and at varying internal pressure, as it can be made more robust than previously known, axially flexible hoses (which are extended 3 to 4 times longitudinally).

The invention will be described more fully below with reference to the attached drawings showing some preferred embodiments.

Fig. 1 shows a floor vacuum cleaner and a suction conduit device according to the invention in its storage position, the corresponding operative position being indicated by dashed lines;

Fig. 2 shows the suction conduit device in its operative position, wherein the suction hose is connected to a floor vacuum cleaner;

Fig. 3 shows in a side view and partly in section the connection of the suction hose to the tube handle in its operative position;

Fig. 4 shows a corresponding view of the coupling sleeve of the suction hose, which in its storage position cooperates with one end portion of the tube handle; and

Fig. 5 shows in a side view and partly in section an alternative embodiment of the suction conduit device according to the invention.

In Figures 1 to 4, thus, a first embodiment of the suction conduit device according to the invention is shown, namely with a suction hose 1, which is externally mountable on a rigid tube handle 2. In Fig. 1 the device is shown in its storage position, separated from an upright floor vacuum cleaner. The dashed lines indicate that the flexible suction hose 1 can be connected either to such an ordinary floor vacuum cleaner 3 or to a suction opening or floor valve 3' belonging to a central suction system (not shown).

In Fig. 2 the suction conduit device 1,2 is shown in its operative position, wherein a coupling sleeve 4 at one end portion 1a of the suction hose 1 is connected to the suction opening of the vacuum cleaner 3, whereas the other end portion of the suction hose 1 is connected to the rigid tube handle 2 by means of a sleeve device 5. The tube handle consists of a bent tube section 2a and a straight tube section 2b being removably connectable thereto, on the free end of which tube section 2b an ordinary suction nozzle 6 is mounted. In this operative position the flexible suction hose 1, being in its state of rest without axial tension, is 20-80%, in particular 30-40%, longer than the rigid tube handle 2, which per se is common in conventional



vacuum cleaners with associated suction conduit devices.

However, according to the invention the suction hose 1 is axially contractable to the storage position shown in Fig. 1, where it is entirely mounted externally onto the rigid tube handle 2 and is kept in this position by means of holding means, namely the sleeve device 5, which in this position abuts axially against an external stop sleeve 7 on the end portion of the straight tube section 2b, and the coupling sleeve 4, which is internally clamped onto a stop sleeve 8 on the end portion of the bent tube section 2a (Fig. 4). In the storage position according to Fig. 1, the unit consisting of the tube handle 2 and the mounted suction hose 1 is about 1.2 m long.

The sleeve device 5, which is shown in detail in Fig. 3 (in its operative position according to Fig. 2), consists partly of a sleeve-like connection portion 5a, partly of a handle portion 5b. The connection portion 5a is securely connected to the end portion 1b of the suction hose 2 shown to the left in the figures and is rotatably connected to the handle portion 5b, which on the outside is shaped as a handle and on the inside has a conical surface 5c, which in the operative position according to Figures 2 and 3 engages with a corresponding conical surface 8a of the stop sleeve 8. The conical angle in this portion of the stop sleeve 8 is such that the stop sleeve extends externally in the direction towards the free end portion of the bent tube section 2a, thereby preventing the sleeve device 5 from sliding off this end portion from the stop sleeve 8. In the position according to Fig. 3 the sleeve device 5 is kept in a fixed position by means of a latch device consisting of a latch pin 9 engaging in a round groove 8b in the conical surface 8a of the stop sleeve 8, and an actuating lever 10, by means of which the latch pin 9 can be freed from the groove 8b, so that the sleeve device 5 can be displaced along the tube handle 2a, 2b to the other end position according to Fig. 1.

When mounting the flexible suction hose 1 onto the rigid tube handle 2a, 2b, the handle portion 5b of the sleeve device 5 is

used at first. In the final phase of the mounting movement one must grab the coupling sleeve 4 by hand and thereby axially contract the suction hose until the coupling sleeve reaches the stop sleeve 8 at the end portion of the tube section 2a (Fig. 4). The coupling sleeve 4 consists partly of a connection portion 4a fastened to the hose end 1a, partly of a coupling portion 4b rotatably connected thereto, which coupling portion 4b is connectable by bayonet locking to the floor vacuum cleaner 3 or suction opening 3' shown in Fig. 1. In the storage position according to Fig. 4, the connection portion 4a is retained by means of mutual clamping action between an internal conical part 4c in the same and an external conical part 8c of the stop sleeve 8. In order to achieve a good clamping action the conical angle is somewhat larger in the part 8c than in the part 4c so that the connection portion is somewhat resilient in a radial direction when fixed into the position according to Fig. 4.

Of course, the sleeve device 5 could alternatively be secured by clamping on the stop sleeve 8 in the position according to Fig. 3, and the coupling sleeve 4 could be locked by of a latch means in the position according to Fig. 4.

In Fig. 1 an alternative embodiment is shown wherein the flexible suction hose 1' is insertable under axial contraction inside the section of the rigid tube handle 2'a, 2'b. One end portion of the suction hose 1' is fixed to a sleeve 5', which is displaceable between the tapered free end portion 11 of the straight tube section 2'b and the free end portion of the bent tube section 2'a, which latter free end portion for this purpose has a constriction 12 adjoining an outwardly widened end portion 13. In this end portion 13, the coupling sleeve 4' of the suction hose can be secured by clamping, namely when the suction hose 1' is located in the shown storage position according to Fig. 5.

Several modifications can be made about by a man skilled in the art within the scope of the appended claims. Thus, the sleeves 4 and 5 of the suction hose can be formed in different ways for adaption to the particular requirements with regard to internal as well as external storage of the suction hose. Also, the locking of the sleeves at the end portions of the tube handle can be modified. However, it is essential that the suction hose, being longer in its state of rest, can be contracted on or in the shorter tube handle in the storage position as a compact unit separate from the vacuum cleaner itself or from the suction opening of a central suction system. Furthermore, the tube handle can be designed in several ways and possibly also be telescopically conductable, the tube handle being stored in an extended position.

As the suction hose is stored in an axial contracted position on or in the tube handle, the suction hose will automatically expand axially upon release of the holding means (4,8 and 4',13, respectively) and thus facilitate the telescopic extension to an operative position. If it is desired to facilitate the return to a storage position in a corresponding way, a resilient reel could be arranged on the end portion located closest to the suction nozzle (6) or in the sleeve device (5 and 5', respectively) of the hose so that the sleeve device after release of the holding means (5,8 and 5',12, respectively), is automatically displaced along the tube handle by means of a line being kept stretched between the reel and the sleeve device or said end portion, respectively.

## C L A I M S

1. A suction conduit device connectable to a floor vacuum cleaner (3) or a central suction system (3'), comprising a flexible, axially stretchable suction hose (1;1') being connectable to a suction opening in said floor vacuum cleaner or said central suction system, and a rigid tube handle (2;2') connectable between the suction hose (1;1') and a suction nozzle (6), wherein the suction hose and the tube handle are dimensioned to at least partly slide telescopically into each other, c h a r a c t e r i z e d i n that the suction hose (1;1'), one end portion of which is removably connectable to said suction opening, is axially contractable from an operative position (Fig.2) substantially free from tension, in which it is 20-80%, in particular 30-40%, longer than the tube handle (2;2'), to a contracted storage position (Fig. 1;Fig. 5), in which it is entirely inserted into or mounted onto the tube handle, the suction hose (1;1') and the tube handle (2;2') at their respective end portions being provided with holding means (4,5,7,8;4',5',11,13) mutually cooperating in order to keep the suction hose in the contracted storage position, so that the tube handle and the suction hose form a telescopical unit storable in a compact state separate from said floor vacuum cleaner or said central suction system.

2. A suction conduit device according to claim 1, wherein the suction hose at one end portion thereof comprises a sleeve device (5;5'), which in said operative position adjoins an end portion of the tube handle (2;2') opposite the suction nozzle (6), and at its other end portion has a coupling sleeve (4;4') being connectable to said suction opening (3;3'), c h a r a c - t e r i z e d i n that the sleeve device (5;5') and the coupling sleeve (4;4') constitute said holding means of the

suction hose (1;1'), which holding means in said storage position cooperate with a stop means (7,8;11,13) at the end portions of the tube handle (2,2').

3. A suction conduit device according to claim 2, characterized in that said stop means of the tube handle (2,2') at said one end portion is constituted by a sleeve (8) or flange (12,13), which in said operative position cooperates with the sleeve device (5,5') of the suction hose and in said storage position cooperates with the coupling sleeve (4,4') of the suction hose.

4. A suction conduit device according to claims 2 or 3, wherein the suction hose is externally mountable to the tube handle, characterized in that said sleeve device (5) serves as a handle (5b) partly in said operative position (2), i.e. during vacuum cleaning, partly when mounting the suction hose (1) onto the tube handle (2).

5. A suction conduit device according to anyone of claims 2-4, characterized in that said sleeve device (5) consists of a connection part (5a) secured at the hose end portion (1b) and a handle part (5b) rotatably connected thereto, which handle part cooperates through friction engagement and/or by of latch means (9) for locking at at least one of said stop means (8b).

6. A suction conduit device according to anyone of claims 2-5, characterized in that said coupling sleeve (4) consists of a connection part (4a) secured to the hose end portion (1a) and a coupling part (4b) rotatably connected thereto, which coupling part is connectable to said suction opening (3,3') in said operative position, wherein the connection part (4a) of the coupling sleeve cooperates by friction engagement and/or by latch means for locking at the stop means (8c) at said one end portion of the tube handle in said storage position.

7. A suction conduit device according to anyone of claims 2-6, characterized in that said stop means of the tube handle (2;2') at said second end portion is constituted by said suction nozzle or a sleeve (7) or a flange (11).

8. A suction conduit device according to anyone of the preceding claims, characterized in that the tube handle (2,2') consists of at least two mutually connectable tube sections (2a,2b;2'a,2'b), at least one (2b;2'b) of which being straight.

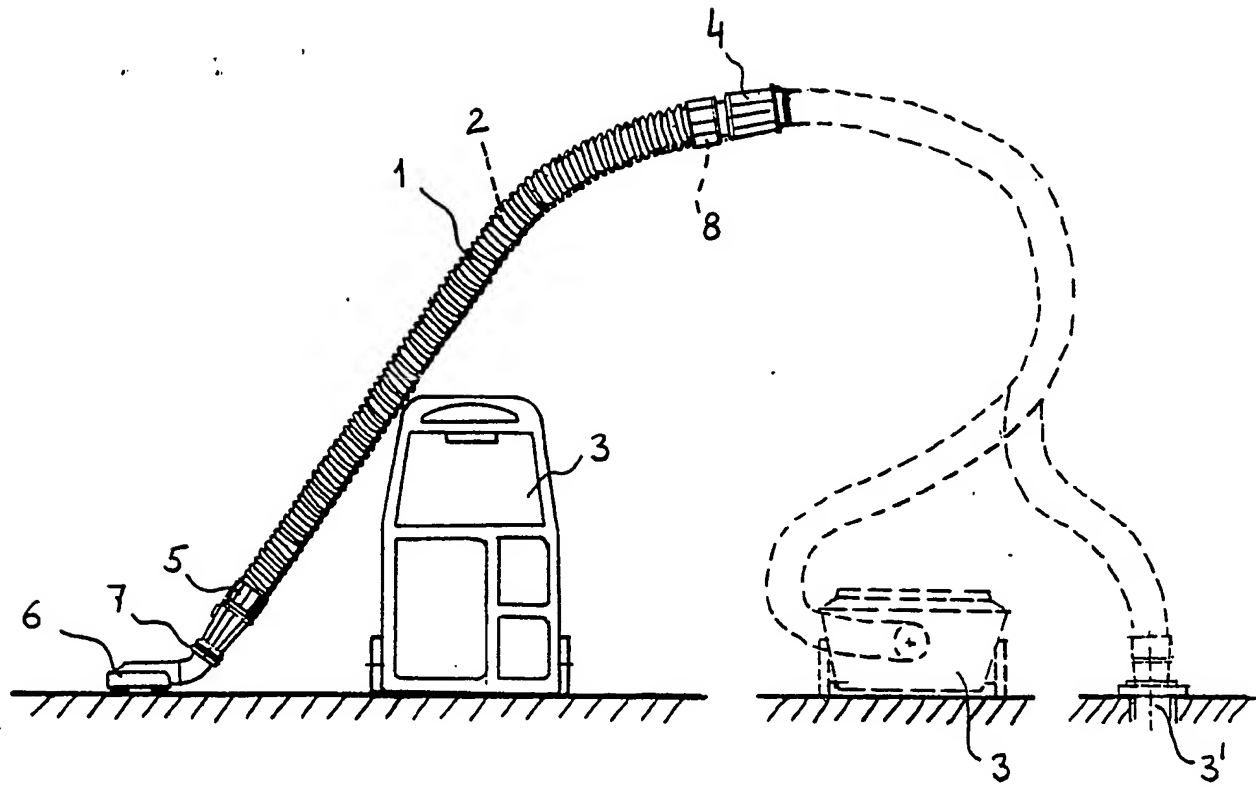


Fig. 1

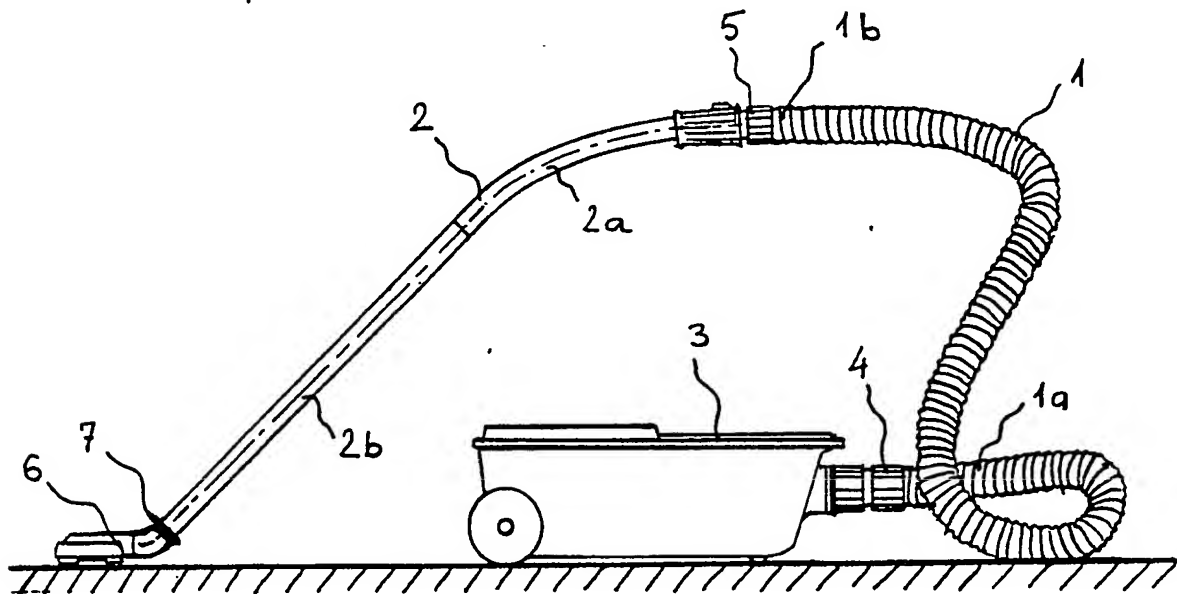


Fig. 2

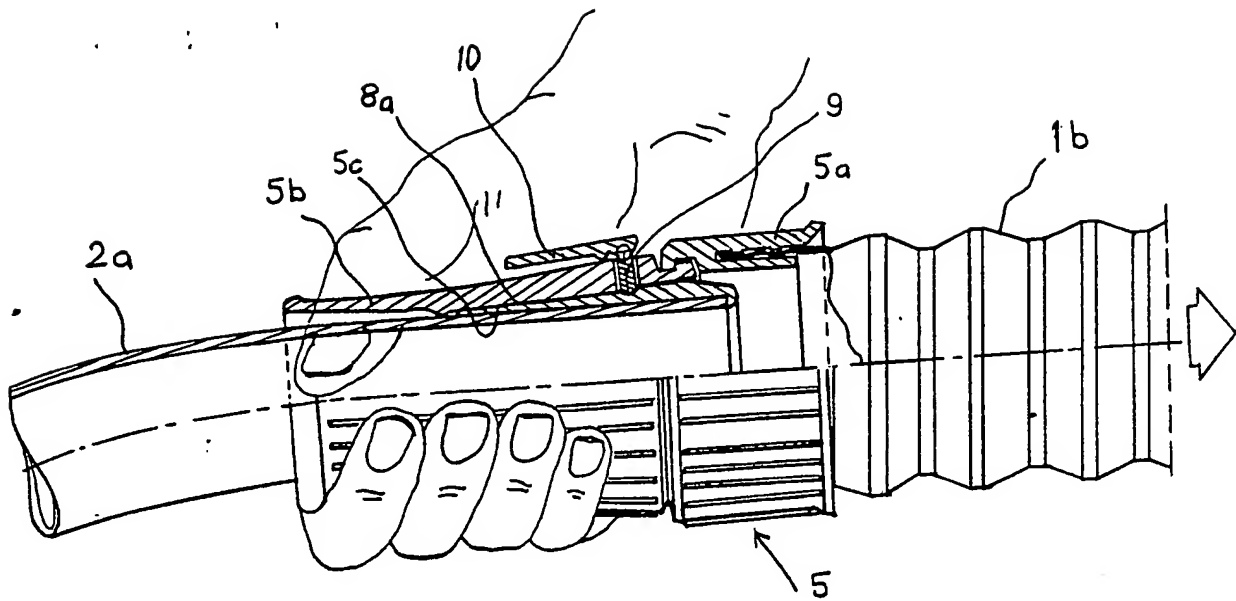
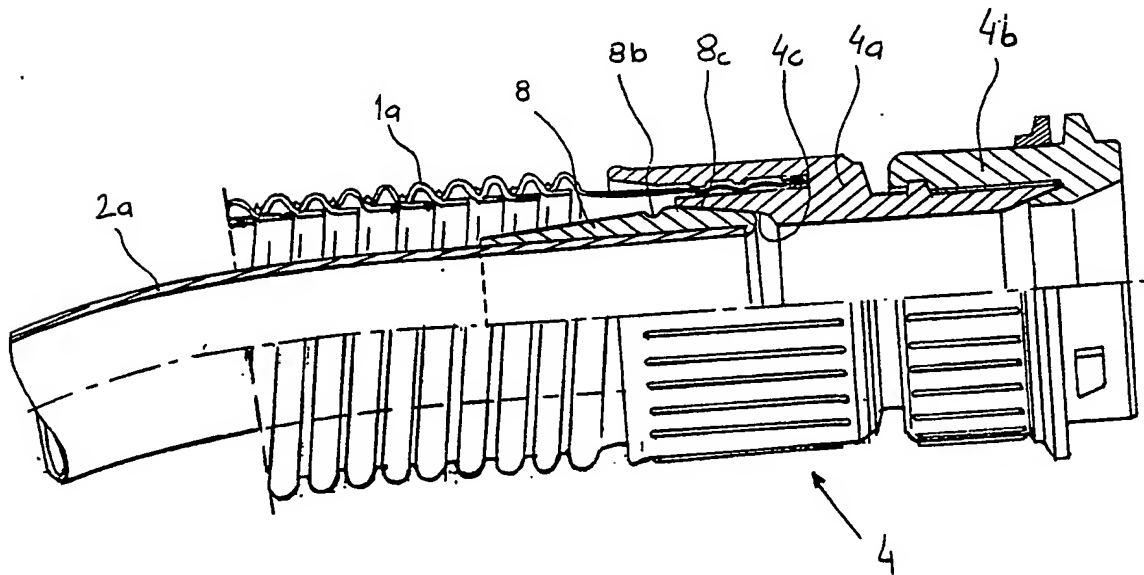


Fig. 3





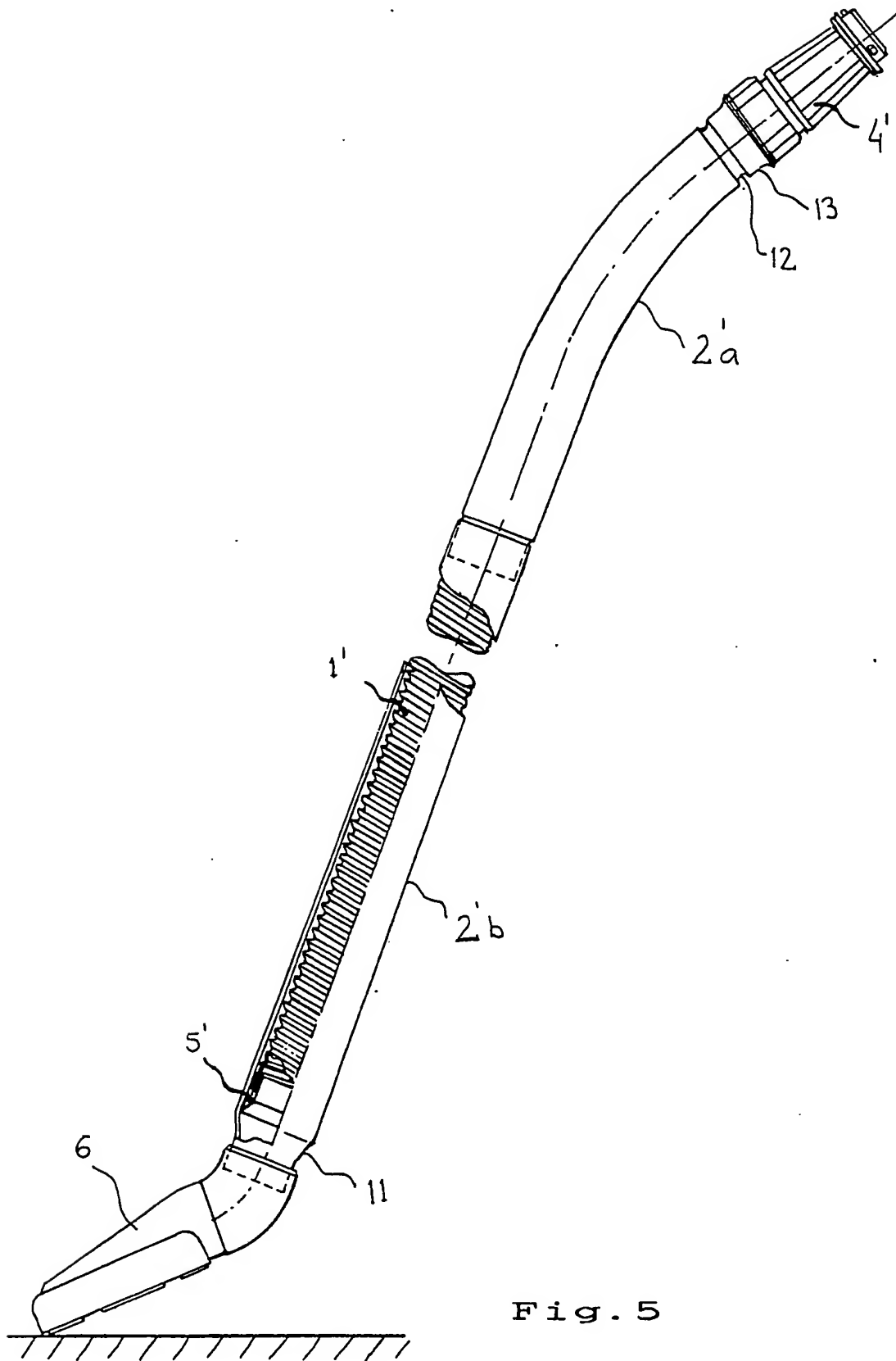


Fig. 5

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/SE85/00324

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
A 47 L 9/24		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC 4 US C1	A 47 L 9/24, /32 15:314, 315, 323, 410, 411, 414	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT 9</b>		
Category *	Citation of Document, 11 with Indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
A	EP, A1, 0 037 674 (J DYSON) 14 October 1981	
A	US, A, 2 867 833 (J E DUFF) 13 January 1959	
A	US, A, 4 050 113 (G T WRIGHT ET AL) 27 September 1977	
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<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
1986-03-25	1986-04-01	
International Searching Authority	Signature of Authorized Officer	
Swedish Patent Office	Björn Kallstenius	

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